PHILOSOPHICAL *TRANSACTIONS.*

Munday October 22. 1666.

The Contents.

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Patternes

Of the Tables *propoſed to be made for* Obſerving of Tides, *promiſed in the next foregoing* Tranſactions; *by Sr.* Rob. Moray.

IN performance of what was promiſed in the laſt of theſe *Papers* for Obſerving the *Tides*, here are ſubjoyned *Patternes* of the *Tables* there mentioned: *One*, for making the *preciſe Time* of the High-waters and Low-waters during one Month; that is, between *New* and *New* Moon, or *Full* and *Full* Moon. The *other*, for marking the *Degrees* of the Riſings and Fallings of the Water in *Equal* ſpaces of Time, and the *Velocity* of its motion at *ſeveral* heights: The *Degrees* of *Heat* and *Cold*, &c.

The *Times*, aſſigned in the *firſt*, to the High-waters and Loweſt Ebbs, are taken out of Mr. *Wing*'s Almanack, for this preſent Year 1666, as he calculates them for the Month of *September* for *London Bridge*. Only, whereas he takes notice but of *one* High-water for every day, *Here* are ſet

down the Times of the other, and the two Ebbs intervening, by ſubdividing the *Differences*, he aſſignes between two Tides, equally amongſt them. In all which, though there may be Errors, that is not to be conſidered, ſeeing the Diſſein is to Correct and State the *Times* of the Tides *exactly* by *Experiments*, after this method. Mr. *Wing* ſtates the High-waters to fall out at *London-Bridge* conſtantly, when the Moon is 46. deg. 30. min. to the *Weſt-ward* of the *Meridian*. For, the Times, he marks for them, are made up by adding every day 3. hours, 6. minutes, to thoſe in his *Table* for knowing the Time of the Moons coming to the South.

The *Firſt Table* conſiſts of *two* parts, and each part of *four Columns*. The *firſt* part marks the Tides and Ebbs from the day of the *New*-Moon to its *Full*: The *other*, from the *Full* to the next *New*. The *firſt Column* in both parts hath the day of the Month and Week; *M.* ſtanding every where for *Morning*, and *A.* for *Afternoon*. The *third* Column hath the *Character* of the day of the Week prefixt to the Hour and Minut of the High-water, and anſwering to the day of the Month. The *laſt* Column hath the ſame for the time of Low-water, varying the *Character* of the day, as often as the Low-water falls out more early than the High-water. In this *Example* between the ſaid *New* Moons there falls out in all juſt 57. periods of the Tide or Flowing water, and 58. of the Ebb or Low-water; which numbers vary according to the Intervals of the Moons changes; but with what conſtancy and exactneſs, is to be inquired after: Which whoſoever undertakes to do, may keep ſuch a *Talle*, as is here propoſed, in a Book by it ſelf.

The *other* Table doth in 9. *Columns* comprehend the Particular Obſervations of the *Degrees* of the Riſing and falling of the Tides, and the other things ſpecified at the Tops of them: The *firſt* Column marking the Hour and Minut common to all the ſeveral Obſervations. Each hour is divided in 3. equal parts, that number of Obſervations being only pitch't upon by way of *Example*: The numbers may elſe be varied at pleaſure, when other more frequent Obſervations are thought fit to be made, or when they prove too frequent and laborious; though the moſt frequent are moſt deſirable, till competent Information of all particulars be attained.

The *Riſing* of the Tide from Low-water to the higheſt pitch of the Full Sea, is here ſuppoſed to be 60. foot: And the Degrees of its riſing every 20. Minuts, to be in the *Proportion* of *Signes*; The whole time of Flowing ſuppoſed to be 6. hours. But this *Example* will ſerve for marking the *Spaces* of the Increaſing or Riſing, as well, as of the falling of the water, in order to the Inveſtigation of their *Proportions* to one another, when the *Duration* of the Tide exceeds 6. hours by any number of *minuts*, as well as for juſt 6. hours; ſeeing they may eaſily be collected from any Number of Obſervations; their preciſe Time and that of the Duration of the waters Riſing and Falling (that is, the juſt interval between the High-water and Low-water) being known: This Calculation by *Signes* being only ſet down as a *Conjecture*, flowing from Obſervations of the Motion of the water in its Riſing and Falling, which

which ſeems to obſerve this or ſome ſuch like Proportion; which is ſuppoſed ſtill to hold in *all* Tides, be the *Duration* what it will; the Increaſe ſtill continuing proportionably till the very midle of the Hight and Duration, and Decreaſing afterwards in the ſame manner: Which whether it be ſo indeed or not, is that, which is deſired to be known.

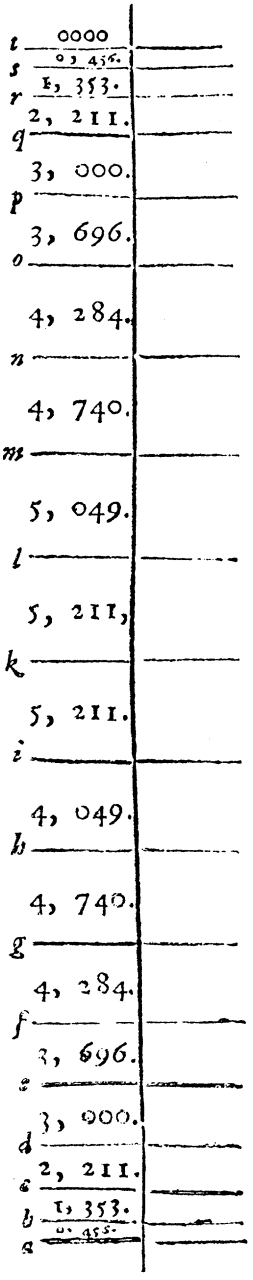
There is the like Proportion here ſuppoſed to be in the *different degrees* of the *Velocity* of the Current of the Water after *Equal* ſpaces of Times, as in its Riſing and Falling: And ſo it is markt in the *Third* Column. But because the *true Velocity* of the Current of the Water, raiſed above the Level $\frac{115}{1000}$ of a foot, is unknown, it is by way of Suppoſition ſet at Ten feet in one Minute of an Hour, which being once ſtated, the reſt diſtant from each other by the ſpace of 20 Minutes of an Hour, are ſet down according to the ſame *Proportion* of *Signes* before ſuggeſted. It being ſuppoſed, that if the the *Velocity* of the Current of the Tide, after it hath flowed 20 minutes of an hour, be ſuch, as a Log of Wood placed in the Water will move 10 foot in the ſpace of one minute of time, at the middle of the Tide it will in the like ſpace of Time move 114 f. $\frac{275}{1000}$, and ſo proportionably at other times: Which, howſoever theſe Proportions ſhall be found by Experiments to fall out, may be not unworthy of the pains and charges requiſite to acquire the knowledge of it. For, beſides the ſatisfaction it may afford upon other accounts, it may poſſibly be of no ſmall uſe to thoſe, who need an exact reckoning of their Ships running, when the Velocity of the Current of the Tide may be neceſſary to be known; leſt through the defect of the knowledge of that, eſpecially when it is reckoned leſs than indeed it is, the Ship be thrown in the night upon Shores, Rocks or Sands, when they reckon themſelves to be far from them.

The Numbers in the 4, 5, 6, 7, and 8. *Columns* are ſet down at random, only for *Examples* ſake; there being no difficulty in the apprehenſion of it, and imitating of it in ſetting down the true Hights and Variations of the *Thermometer*, *Baroſcope*, &c. the Uſe whereof is ſo vulgarly known, that there needs no further Direction concerning them. But if any perſon, who would make theſe Experiments, do not know the fabrick or uſe of any of the Inſtruments requiſite for ſome of theſe Obſervations, nor where to have them, he may addreſs himſelf to Mr. *Shortgrave*, one of the *Operators* of the *Royall Society*, lodged in *Greſham Colledge*, from whom he will receive full ſatisfaction about theſe things.

But the labour employed in the Obſervations of the Heat, Cold, &c. required to be taken notice of in order to the Ends propoſed in the former *Tract*, and others, that may be of no leſs delight than advantage, will be much retrenched, when Dr. *Chriſtopher Wren* puts in practiſe, what he ſome years ago propoſed to the *Royal Society* concerning an *Engine* with a *Clock-work*, which may perform theſe Obſervations in the laſt enumerate *Columns*, without being toucht or lookt after but once or twice a day.

The Tables themſelves follow.

A Perpendicular Line divided into Signes, *ſuppoſed to be the* Periods *of the Riſings and Fallings of the Tides, as is in the other Table repreſented.*



a The Low-water.
k The Middle.
i The High-water.

1666. Sept.	Age of the ☽ ho. mi.	Time of High water. Day. Hour. Min.	Time of Low water. Day. Hour. Min.	1666. Sept. 18.	Age of the ☽. ho. mi.	Time of High water. Day. Hour. Min.	Time of Low-water. Day. Hour. Min.	1666. Sept. 3. Hour. M.
	New 8. 38'. ●	☽. 2. 57. Morn.	☽. 9. 8. Morn.	♂ 18.	Full. 11. 10' ○	♂ 2. 50½ M.	♂. 9. 4¼ M.	XII. 00
☽. 3.		3. 19. Aftern.	9. 30. Aftern.			3. 18. A	9. 31½ A.	20.
♂ 4.		♂. 3. 41. M.	♂. 9. 51½ M.	☿. 19.		☿. 3. 45. M.	☿. 9. 58½ M.	40.
		4. 2. A.	10. 12½ A.			4. 12. A.	10. 25½ A.	I. 00
☿ 5.		☿. 4. 23. M.	☿. 10. 33¼ M.	♃. 20.		♃. 4. 39. M.	♃. 10. 52½ M.	20.
		4. 43¼ A.	10. 53¼ A.			5. 6. A.	11. 20. A.	40
♃ 6.		♃. 5. 4. M.	♃. 11. 14½ M.	♀ 21.		♀. 5. 34. M.	♀. 11. 48. M.	II. 00
		5. 25. A.	11. 35½ A.			6. 2. A.	0. 16. A.	20
♀ 7.		♀. 5. 46. M.	♀. 11. 56½ M.	♄ 22.		♄. 6. 30. M.	♄. 0. 44. A.	40
		6. 7. A.	♄. 0. 17½ M.			6. 58. A.	☉. 1. 12½ M.	III. 00
♄ 8.		♄. 6. 28. M.	0. 39½ A.	☌ 23.		☉. 7. 27. M.	1. 41½ A	20
		6. 51. A.	☉. 1. 2½ M.			7. 36. A.	☽. 2. 10¼ M.	40
☉ 9.		☉. 7. 14. M.	1. 25½ A.	☽ 24.		☽. 8. 24½ M.	2. 38¾ A.	IIII. 00
		7. 37. A.	☽. 1. 48¼ M.			8. 53. A.	♂. 3. 6¼ M.	20
☽ 10		☽. 8. 0. M.	2. 13. A.	♂ 25.		♂. 9. 20½ M.	3. 34¼ A.	40
	1. Qu. 10. A. ☽	8. 26. A.	♂. 2. 39. M.		last Q. 3. 11'. ☾	9. 48. A.	☿. 4. 1¼ M.	V. 00
♂ 11.		♂. 8. 52. M.	3. 5. A.	☿ 26.		☿. 10. 15½ M.	4. 29¼ A.	20
		9. 18. A.	☿. 3. 31. M.			10. 43. A.	♃. 4. 56½ M.	40
☿ 12.		☿. 9. 44. M.	3. 57¼ A.	♃. 27.		♃. 11. 10. M.	5. 23½ A.	VI. 00
		10. 11½ A.	♃. 4. 25¼ M.			11. 37. A.	♀. 5. 48. M.	
♃ 13.		♃. 10. 39. M.	4. 53. A.	♀ 28.		♀. 11. 59. M.	6. 10. A.	
		11. 7. A.	☿. 5. 21. M.	♄ 29.		♄. 0. 21. M.	♄. 6. 32. M.	
♀ 14.		♀. 11. 35. M.	5. 49. A.			0. 43. A.	6. 54. A.	
♄ 15.		♄. 0. 3. M.	♄. 6. 17. M.	☉. 30.		☉. 1. 5. M.	☉. 7. 16. M.	
		0. 31. A.	6. 45. A.	*Octob.*		1. 27. A.	7. 38. A.	
☉ 16.		☉. 0. 59. M.	☉. 7. 13. M.	☽. 1.		☽. 1. 49. M.	☽. 7. 59. M.	
		1. 27. A.	7. 41. A.			2. 9. A.	8. 19. A.	
☽ 17.		☽. 1. 55. M.	☽. 8. 9. M.	♂ 2.		♂. 2. 29. M.	♂. 8. 39. M.	
		2. 23. A.	8. 36¾ A.			2. 49. A.	8. 59. A.	
♃ 18.				☿ 3.	New. 1. 38'. ○	☿. 3. 9. M.	☿. 9. 19. M.	

1666. Sept. 3. Hour. M.	Rising, and fall of Tides Foot	1000	Velocity of the Current Foot	1000	Thermometre Inch	To	Baroscope Inch	To	Hygroscope Inch	To	Azimuth. deg.	Force of the Wind deg.		Weather.
			00,	000.										
XII. 00	0,	000.	00,	000.	5.	7.	28.	1.	3.	4.	S. to W.	50.	3.	*Rain great*
20.	0,	456.	10,	000.	6.	7.	28.	1.	3.	4.	S. to W.	57.	3.	*Rain great*
40.	1,	353.	36,	250.	6.	8.	28.	1.	3.	4.	S. to W.	60.	3.	*Rain small*
I. 00	2,	211.	48,	587.	6.	8.	28.	1.	3.	3.	S. W.	45.	4.	*Rain small*
20.	3,	000.	66,	658.	6.	8.	28.	1.	3.	2.	S. W.	30	4.	*Rain very small*
40.	3,	696.	81,	053.	6.	9.	28.	2.	3.	1.	S. W.	36.	4.	*Fair but cloudy*
II. 00.	4,	284.	93,	289.	6.	9.	28.	2.	3.	0.	S. W.	39.	5.	*Fair and warm*
20.	4,	740.	103,	289.	6.	9.	28.	2.	2.	7.	S. W.	42.	5.	*Warm and cloudy*
40.	5,	049.	110,	724.	6.	8	28.	2.	2.	3.	S. W.	19.	6.	*Sunshine*
III. 00	5,	211.	114,	276.	6.	8.	28.	2.	2.	0.	S. W.	60.	5.	*Sunshine and clear*
20.	5,	211.	110,	724.	6.	7.	28.	3.	2.	1.	S. W.	73.	5.	*Sun clouded*
40.	5,	049.	103,	289.	6.	7	28.	3.	2.	0.	S. W.	90.	6.	*Cloudy (the Horiz*
IIII. 00	4,	740.	93,	289	6.	6.	28.	3.	2.	1.	S. W.	90.	6.	*Hazy about*
20.	4,	284.	81,	053.	6.	6.	28.	4.	2.	3.	N. W.	87.	6.	*Misty*
40.	3,	696.	66,	658.	6.	5.	28.	4.	2.	3.	N. W.	70.	7.	*Misty*
V. 00	3,	000.	48,	487.	6.	4.	28.	4	2.	3.	N. W.	59.	7.	*Clearing up*
20.	2,	211.	36,	250.	6.	2.	28.	5.	2.	3.	N. W.	50.	6.	*Clear*
40.	1,	353.	10,	000.	6.	1.	28.	5.	2.	1.	N. W.	60.	5.	*Sunshine*
VI. 00	0,	456.	00,	000.	6.	0.	28.	5.	2.	0.	N, W.	60.	4.	*Sunshine*